EASY PARK: A PARKING LOT GUIDANCE SOFTWARE

Namitha Menon K[1], Jisna Joseph[2], Lismaria K Thomas[3], Ann Rija Paul[4]
U.G.Scholar[1,2,3], Assistant professor[4]
Department of Computer Science & Engineering,
Sahrdaya College of Engineering and Technology, Kodakara, Kerala, India

Abstract

Parking of vehicles in existing scenario is getting difficult as number of vehicles keeps on increasing. Parking is a problem for almost everyone today so there has to be a solution, which helps getting rid of problems arising due to the lack of a proper parking management system. The situation of looking for parking space and traffic congestion in parking areas is due to the fact that the information of available parking spaces is not readily available to the people looking for parking spaces. However, the weakness of current parking lot guidance systems is the information of parking lot are presented from the devices located in each shopping mall and most parking lot systems are typically maintained and not interconnected with any other system. So, the drivers can see the parking lot information if and only if they arrive at the shopping mall area. We propose the parking lots guidance software to share a parking lot information to a large number of clients in real-time based on MQTT Protocol. MQTT is the lightweight protocol, it can be used to handle a lot of dynamic data from many devices. The proposed system enables the drivers to check whether the parking slot is available and book the available space an hour before they arrive at parking slot with a small payment.

Index Terms: MQTT, RFID number, Parking management, Traffic congestion, Parking lot.

I. INTRODUCTION

It has been observed that a considerable amount of time get wasted while trying to find vacant spot at large public spaces, if no parking spaces are available parking has been done elsewhere thus resulting in more time being wasted and also cause a situation where the traffic would be slowed down, congestion and air pollution. EASY PARK is the concept where technological solutions are designed to overcome these issues. The proposed software can share the real-time parking lot information to the mobile devices of the drivers in any location or when they are driving on the road. If the drivers can see the whole of parking lot information, they can plan to drive, find the free slot, and book the slot park their vehicle quickly. There are some of the attempts that try to distribute the parking lot information to the drivers before they arrive at the parking area. Such system may not be scalable when there are lots of users. So, if lots of drivers in the city trying to acquire the parking lots information simultaneously, the response time of thesystem can be slow down.

To provide the parking lot information for the drivers, we consider the Message Queue Telemetry Transport (MQTT) protocol, the publish/subscribe lightweight messaging protocol to be the core of data communication between the parking lot guidance system to mobile devices of the drivers. Since MQTT is the lightweight protocol, it can be used to handle a lot of dynamic data from many devices. So, with the MQTT protocol, lots of drivers can see the parking lots information before they arrive at the shopping mall. That is they can plan their parking from home. Thus, this paper we propose the Parking Lots Guidance Software to share the parking lots information for a large number of clients in real-time based on MQTT Protocol.

The proposed system enables the drivers to check whether the parking lot is available at specific location can plan their parking from home and book the available space an hour before they arrive at parking slot with a small payment. This can be done using their mobile devices such as tablets, laptops and mobile phones using the web application. If the vehicle not reached after an hour automatic cancellation can be done. The customer can register on the website by giving their details and book slot using an RFID number. This information's is stored on a central server. Vehicle can be parked only after verification of RFID number and it is again read before leaving for calculate the time taken by the vehicle for parking. According to the time duration payment can be done

II. RELATED WORK

Some of the closely related works for parking slot detection have been discussed in this section.

Authors in [1] proposed parking lot guidance software using MQTT protocol. . The proposed software can share the real-time parking lot information to any driver via a mobile phone. The experimental results show that the proposed software can support for at least 1,000 sessions of clients. In the future work, we intend to investigate the performance of the proposed system when the number of clients more than 1,000 clients that connect to the system simultaneously. Each slot in the parking lot is monitored by the hardware component including; the ultrasonic sensor, the controller, andthe light bulb.

In "M-Parking: Vehicle Parking Guidance System using Hierarchical Wireless Sensor Networks"[2] published in IEEE Journal in 2016, which guide the vehicle drivers to the parking space using Hierarchical Wireless Sensor Networks. Hierarchical Wireless Sensor Network (HWSN) consists of hundreds of sensor nodes which sense the environment phenomenon. Three sensors per parking slot based technique is used to distinguish the type of parked vehicles and to find the free parking slots in the parking area. Free, partially-occupied and occupied parking slot states information is stored at the Parking Server in the form of parking location and the parking area layout with parking slot states marking on it. Parking Server makes the parking information available to the vehicle drivers by the mean of web and mobile applications for guiding vehicles for parking.

In "Reservation Based Parking System with Dynamic Slot Allocation" [3] published in IEEE Journal in 2015, which describes a system implementation of dynamic memory allocation using arrays and how it is better than other methods. This paper highlights the difficulties faced by the customers searching for spaces while parking vehicles, shows difference between manual and automated parking system, outlines circle parking system architecture and how the dynamic slot allocation is done in it and the devices required implementing it. Reservation based dynamic slot allocation in parking system first and foremost reduces human intervention required for parking vehicles. It is time efficient and cost effective as the whole process of building a software system is being automated. The delivery of the software system can be assured on time with reduced cost and quality code which is mostly spent on the resources if there were manual work. Hence, this approach plays a vital role in reducing time required in manual parking system. This system is not the replacement for the current manual and automated system available but can be implemented to remove time and cost constraints to build robust applications.

The proposed system [4] is a Raspberry pi based parking sensor which contains pi-camera to detect the empty parking spaces and sends this data to server, this stored data is accessed by users .This enhances the user to check the status/availability of parking spaces before setting their journey. Here the challenge is to use the existing resources in optimum level to reduce the searching time, traffic congestion in the city. Some embedded systems such as auridino, raspberry pi, Tsgate, Tsmote etc. are used to develop internet of things applications.

In "Android Based Smart Car Parking System" [5] published in IEEE Journal in 2016, which describes the system provide users to book parking spaces online in advance for given location and then park the vehicle with minimal fees. It introduces a scaled down model of an automated car parking system that provides the parking slot at any time to user. Also the system

proposes parking fee collection based on number plate recognition. On using Android application on user's device he can make reservation for parking space by providing the information like name, date, time and number of car. When car arrives at entrance parking area, image of number plate is captured by camera. By using image processing and character recognition technology, the car number is matched with registered number to check corresponding information given by user. If the information is confirmed then user can park the car at designated slot. LED's are given to show the information about free slot thus after successful parking, the data will be automated automatically.

III. SYSTEM DESIGN

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before they arrive at parking slot with payment. This can be done using their mobile devices such as tablets, laptops and mobile phones using the web application. If the vehicle not reached after an hour automatic cancellation can be done. The customer can register on the website by giving their details and book slot using an RFID number. This information's is stored on a central server. Vehicle can be parked only after verification of RFID number and it is again read before leaving to calculate the time taken by the vehicle. According to the time duration payment can be done

PROPOSED SYSTEM
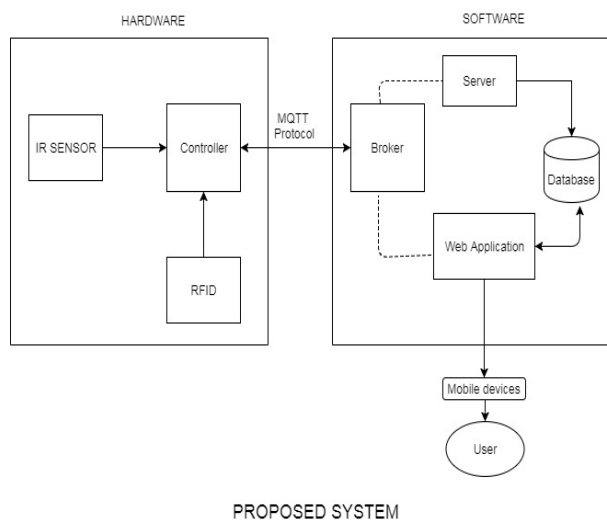
IV. DESIGN AND DEVELOPMENT

The design of a system is essentially a blueprint or a plan for a solution for the system. The design process for a software system often has two levels. At the first level the focus is on deciding which modules are needed for the system, the specification of these modules and how the modules should be interconnected. This is called system design or top level design. In the second level the internal design of the modules or how the specification of the modules can be satisfied, is decided. This design level is called detailed design or logic design.

A. Free Parking Space Detection

Each slot in the parking lot is monitored using sensors to know whether they are free for parking. Based on this information the driver can select the parking space which is free according to his wish. This information obtained from the sensors is then sending to the controller.

B. Controller Unit

The data that contains information about the parking lots, that is, whether they are free or occupied is passed on to the controller by the sensors. The controller publishes this data to the server. The controller also keeps track of the RFID reader to make sure that the appropriate car is parked in the appropriate parking lot.

C. Registration Module

The user can register by giving a valid username and password by which the user can access to the system more easily. When registering, the user will be asked to give some details regarding the vehicle and the user himself. This is done so as to enhance security issues

D. Reservation Module

The user also has a provision to reserve the parking lot as per the free parking lot available. Once the parking lot has been reserved by the user, that particular slot will be allocated to the user and that slot will not be available to others. After reserving, the user has to park his vehicle in the selected parking lot within one hour time or else his reservation will be cancelled.

V. TECHNICAL DESCRIPTION

A. Description of block diagram
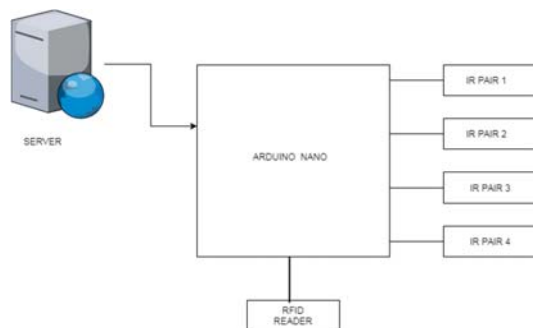1. Controller Unit
2. IR Pair
3. RFID Reader
4. Server

Figure 1. Hardware unit

B. Hardware Description

a) IR Sensor

An infrared sensor is an electronic instrument that is used to sense certain characteristics of its surrounding by either emitting and or detecting infrared radiation. The basic concept of an infrared sensor which is used to transmit an infrared signal bounces from the surface of an object and the signal is received at the infrared receiver.

b) Microcontroller

The Arduino Nano is a small, complete, and breadboard-friendly board based on the ATmega328P (Arduino Nano 3.x). It has more or less the same functionality of the Arduino Duemilanove, but in a different package. It lacks only a DC power jack, and works with a Mini-B USB cable instead of a standard one.

c) RFID Reader/Tag

An RFID system consists of two parts .i.e., a reader, and one or more transponders, which are also known as tags. RFID systems have evolved from barcode labels as a means to automatically identify and track products as well as people. In this system, the user is assigned a unique ID corresponding to the specific trolley. This helps in quick identification and movement of the same.

C. Software Description

a) HTML

Hypertext Mark-up Language (HTML) is the standard markup language for creating web pages and web applications. With Cascading Style Sheets (CSS) and JavaScript it forms a triad of cornerstone technologies for the World Wide Web.Web browsers receive HTML documents from a web server or from local storage and render them into multimedia web pages. HTML describes the structure of a web page semantically and originally included cues for the appearance of the document.

b) JavaScript

All the validation task and animations are has been developed by java script.Java often abbreviated as JS, is a high-level, dynamic, weakly typed prototype based, multi paradigm, and interpreted programming language. Along side HTML and CSS, JavaScript is one of the three core technologies of World Wide Web content production.

c) PHP

PHP is a server-side scripting language designed primarily for web development but also used as a general-purpose programming language. PHP code is usually processed by a PHP interpreter implemented as a module in the web server or as a Common Gateway Interface (CGI) executable. The web server software combines the results of the interpreted and executed PHP code, which may be any type of data, including images, with the generated web page.

VI. RESULT AND CONCLUSION

The proposed software has the high average score of usability, design and the benefits, The proposed software has the high average score of usability, design and the benefits, To provide the dynamic information of a parking lot for the drivers in real-time, we propose the parking lots software based on MQTT Protocol for the data communication between devices. The proposed software can share the real-time parking lot information to any driver via a mobile phone. The proposed software can share the parking lot information in real-time for at least 1,000 sessions simultaneously. The system makes it easy for the user to book or reserve a space on their mobile device. In future work The IR sensors can be replaced by passive infrared sensor (PIR sensor) to enhance detection of vehicle. It could be improvised with voice guided system.

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